

CLARIFYING INTERPERSONAL HETEROGENEITY IN BORDERLINE PERSONALITY DISORDER USING LATENT MIXTURE MODELING

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Significant interpersonal impairment is a cardinal feature of borderline personality disorder (BPD). However, past research has demonstrated that the interpersonal profile associated with BPD varies across samples, which is evidence for considerable interpersonal heterogeneity. The current study used Inventory of Interpersonal Problems–Circumplex (IIP-C; Alden, Wiggins, & Pincus, 1990) scale scores to investigate interpersonal inhibitions and excesses in a large sample ($N = 255$) selected for significant borderline pathology. Results indicated that BPD symptom counts were unrelated to the primary dimensions of the IIP-C, but were related to generalized interpersonal distress. A latent class analysis clarified this finding by revealing six homogeneous interpersonal classes with prototypical profiles associated with Intrusive, Vindictive, Avoidant, Nonassertive, and moderate and severe Exploitable interpersonal problems. These classes differed in clinically relevant features (e.g., antisocial behaviors, self-injury, past suicide attempts). Findings are discussed in terms of the incremental clinical utility of the interpersonal circumplex model and the implications for developmental and nosological models of BPD.

Borderline personality disorder (BPD) is defined in part by interpersonal impairments, including “frantic efforts to avoid real or imagined abandonment” and “unstable and intense interpersonal relationships” (American Psychiatric Association, 2000, p. 710). Other diagnostic features such as affect dysregulation and recurrent suicidal gestures are also associated with specific interpersonal contexts (Benjamin, 1993; Critchfield, Clarkin,

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Levy, & Kernberg, 2008; Herpertz, 1995; Sadikaj, Russell, Moskowitz, & Paris, 2010). Past research, however, has found that interpersonal styles (assessed most often as profiles of traits or interpersonal problems) vary widely across BPD samples (see Hopwood & Morey, 2007, and Wright, Pincus, & Lenzenweger, 2010, for reviews).

Variability in the interpersonal manifestation of BPD is likely to influence the process and outcome of treatment. Although several treatments for BPD have proven efficacious (Bateman & Fonagy, 2009; Clarkin, Levy, Lenzenweger, & Kernberg, 2007; Linehan et al., 2006), variability in treatment response and considerable rates of dropout (see Levy, 2008) suggest the need to tailor available treatments more effectively to each individual. One potentially useful approach would be to use an individual's distinctive interpersonal style in treatment planning. Toward this end, we characterize here the heterogeneity of individuals with borderline pathology using the interpersonal circumplex and latent mixture modeling.

The interpersonal tradition of personality and psychopathology has used the interpersonal circumplex (IPC; see Figure 1, Panel A) as a structural model that organizes interpersonal functioning around the broad domains of Agency and Communion (Wiggins, 1982, 1991). The IPC defines the conceptual and statistical relationships among distinct interpersonal content, and it is attractive for the study of PDs because it models separately general severity versus the specific style of dysfunction (Tracey, Rounds, & Gurtman, 1996). Research linking IPC-based interpersonal dispositions to the *DSM* PD diagnoses has confirmed that many of these disorders have characteristic interpersonal themes reflected in extreme and rigid blends of Agentic and Communal behavior (Pincus & Wiggins, 1990; Soldz, Budman, Demby, & Merry, 1993; Wiggins & Pincus, 1989).

The diagnosis of BPD, however, has not been associated with a consistent circumplex profile. Across a number of studies, BPD has been linked

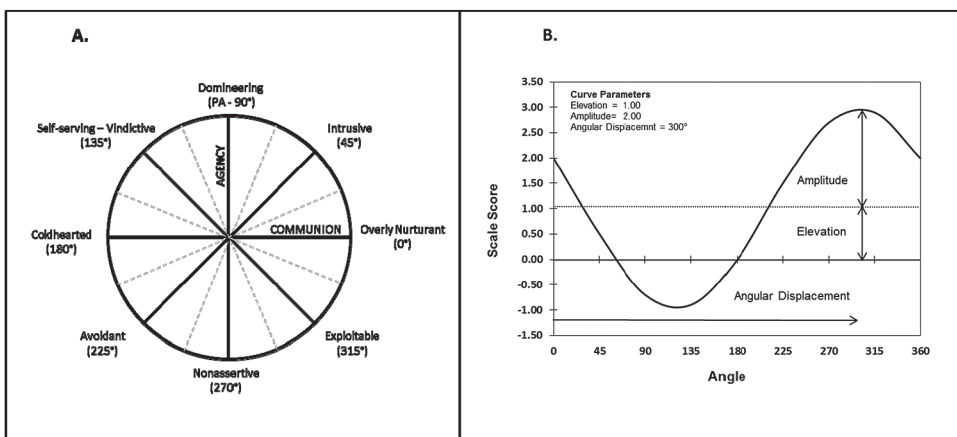


FIGURE 1. The Inventory of Interpersonal Problems Circumplex (Panel A) and an example of a structural summary profile (Panel B).

variously to profiles with affiliative-dominant (i.e., Intrusive; Soldz et al., 1993), affiliative-submissive (i.e., Exploitable; Hilsenroth, Menaker, Peters, & Pincus, 2007; Morey, 1991; Sim & Romney, 1990), or separate-submissive (i.e., Avoidant; Morey, 1985) interpersonal themes. Other studies have found BPD to lack any specific theme (Matano & Locke, 1995; Pincus & Wiggins, 1990). Using cluster analysis in a sample of patients diagnosed with BPD ($N = 95$), Leihener and colleagues (2003) found two subgroups of patients characterized by Vindictive and Intrusive interpersonal profiles. These results were partially replicated using a small ($N = 49$) nonclinical sample with elevated self-reported BPD symptoms (Ryan & Shean, 2007). Taken together, these inconsistent findings across studies may reflect the underlying heterogeneity of interpersonal problems in BPD. However, the majority of prior IPC-based studies have been limited, in part, by modest sample sizes.

Only very recently, Salzer and colleagues (2013) used cluster analysis in a larger sample ($N = 228$) of inpatients diagnosed with BPD and found support for five interpersonal groupings associated with Vindictive, moderate and extreme Nonassertive, Exploitable, and Avoidant problems. Thus, when questions of interpersonal heterogeneity in BPD are investigated in larger samples, a broader array of profiles emerges. These groupings did not differ with respect to a number of additionally diagnosed clinical syndromes (i.e., affective, anxiety, eating, and dissociative disorders), and only the Avoidant group was rated as having lower therapeutic alliance by therapists as compared to others. A clear strength of this study is that the authors used circumplex-based analyses to characterize the groupings. Yet two remaining limitations of all of the studies is that they used suboptimal methods for person-oriented analyses and they offer a modest picture of external correlates.

In the current study, we modeled the heterogeneity in the interpersonal functioning of individuals with borderline pathology using a large sample ($N = 255$) of primarily patient participants. We used the Inventory of Interpersonal Problems–Circumplex scales (IIP-C; Alden, Wiggins, & Pincus, 1990) to measure behavioral excesses and inhibitions in interpersonal functioning. Adopting the framework of the IPC allowed us to ground our results in a general model of personality with a long tradition of clinical utility (Pincus & Wright, 2011) and to leverage the structural features of the circumplex to evaluate mixture model solutions using the *Structural Summary Method* for circumplex group data (Gurtman & Pincus, 2003; Wright, Pincus, Conroy, & Hilsenroth, 2009).

We applied latent class analysis (LCA) to the IIP-C scales, and potential latent class solutions were evaluated using circumplex analyses. Subsequently, we examined the resulting classes on additional variables of clinical importance. A number of hypotheses followed from previous findings and were also motivated by our analytic approach. First, given that BPD has failed to demonstrate a characteristic interpersonal profile, we anticipated that the IIP-C dimensions of Agency and Communion would be un-

related to BPD symptoms, but that general interpersonal distress would be related to BPD symptom severity. Accordingly, we predicted that the whole sample would not be prototypical (i.e., it would exhibit poor fit to any single circumplex profile pattern) and that it would be highly heterogeneous (i.e., it would display high angular variance).

Second, we anticipated that subtyping analyses of our relatively large sample would identify more classes than prior IPC-based cluster models. The resulting classes were hypothesized to be interpersonally prototypical (i.e., exhibit good fit to a circumplex profile pattern) and to be more homogeneous (i.e., low angular variance). On the basis of prior findings, we predicted that we would find classes of patients grouped in the Intrusive, Vindictive, Avoidant, Nonassertive, and Exploitable octants of the IIP-C.

Finally, we predicted that IPC-defined BPD subgroups would exhibit differences on additional clinical variables consistent with their differences in interpersonal themes. Thus, we expected to find that individuals in the Vindictive class would be highest in antisocial behavior, those in the Avoidant class would be highest in avoidant PD symptoms, those in the Intrusive class would be highest in histrionic symptoms, and those in the Exploitable class would be highest in dependent symptoms. In addition, we explored differences across classes in self-harm and suicidal behavior.

METHOD

PARTICIPANTS

Participants for this study were selected from a larger sample of 583 individuals composed of psychiatric patients ($n = 428$, 73%), community members ($n = 132$, 23%), and medical (diabetic) patients not receiving any psychiatric treatment ($n = 23$, 4%). Patients with psychotic disorders, organic mental disorders, and mental retardation were excluded, as were patients with major medical illnesses that influence the nervous system and might be associated with organic personality changes (e.g., Parkinson's disease, cerebrovascular disease, and seizure disorders). Participants from the larger sample who met three or more *DSM-III-R* criteria for BPD¹ were retained for further analysis, consistent with the results of the analyses by Clifton and Pilkonis (2007) for identifying membership in a latent class reflecting significant borderline pathology.

This procedure resulted in the present sample of 255 individuals, 231 (91%) of whom were psychiatric patients, 21 (8%) community members,

1. The data in this study were collected as four separate waves of data, although the procedures for each wave were virtually identical. The first wave of data collection ($n = 152$) began just before the advent of the *DSM-IV* and therefore contains data on only *DSM-III-R* PD traits. The remaining data ($n = 431$) were collected subsequent to the release of the *DSM-IV* and contain ratings on both the *DSM-III-R* and *DSM-IV* PD traits. The *DSM-IV* criteria for BPD are little changed from the *DSM-III-R*, with the exception of the addition of a new criterion for stress-induced dissociative symptoms. To maximize the size of our sample for analysis, *DSM-III-R* criteria were used for all participants.

and 3 (1%) diabetic patients. A majority of the participants were female (75%). In terms of race, 196 (77%) identified as White, 51 (20%) as African American, 4 (2%) as Asian, 3 (1%) as mixed race, and 1 as Native American. Two individuals identified themselves as being of Hispanic ethnicity. At the initial assessment meeting, clinicians described the study in detail and obtained written, informed consent. All study procedures were approved by the University of Pittsburgh Institutional Review Board.

PROCEDURE

Participants completed a battery of self-report questionnaires and clinical interviews. Interviewers were trained clinicians who had a master's or doctoral degree and at least 5 years of clinical experience. At intake, each participant was interviewed for a minimum of three 2-hour sessions by a single interviewer. Assessments included structured diagnostic interviews for Axis I and II disorders, as well as a semistructured interview used to elicit a detailed social and developmental history. Following the initial evaluation sessions, the primary interviewer presented the case at a 3-hour diagnostic conference with colleagues from the research team. A complete description of the consensus rating process used in this research program has been provided in previous reports (e.g., Pilkonis, Heape, Proietti, & Clark, 1995). All available data were reviewed and discussed: current and lifetime Axis I symptoms and diagnoses, social and developmental history, and personality features acknowledged on the Axis II interviews. Each *DSM-III-R* PD symptom was rated on a scale of 0 (*not present*), 1 (*present*), 2 (*marked*). For BPD symptoms the *present* and *marked* ratings were collapsed to form a single rating of "*present*." For the remainder of the analyses involving co-occurring PD symptoms, all three categories were retained. Additional questions were added to the interview protocol for the assessment of BPD in order to gather more detailed information regarding suicidal and nonsuicidal self-injury over both the participant's lifetime and the past 2 years.

MEASURES

Inventory of Interpersonal Problems—Circumplex Scales (IIP-C). The IIP-C (Alden et al., 1990) is a 64-item measure of interpersonal problems and associated distress. Items assess behaviors that an individual does in excess (i.e., "I do . . . too much") or finds difficult to do ("It is hard for me to . . ."). The IIP-C provides coverage for the full range of interpersonal content mapped by the IPC with eight 8-item scales (i.e., octant scales). Each octant scale is labeled based on the central theme of its interpersonal problems, with names provided in Figure 1, Panel A. Internal consistency of the scales is adequate in the current sample (*Mdn* $\alpha = .82$; range = .75–.91).

Brief Symptom Inventory (BSI-18). The BSI-18 (Derogatis, 2001) is an 18-item self-report measure of psychological distress. Participants report psychological distress experienced during the past week on a 0 (*not at all*)

to 4 (*extremely*) scale. For this study, we included the BSI-18 global severity index ($\alpha = .93$).

RESULTS

PRELIMINARY DATA ANALYSIS

As an initial analytic step, we examined in two ways whether BPD criteria were associated with a specific pattern of interpersonal problems. First, we correlated the total count of BPD criteria with the Domineering problem dimension, Affiliative problem dimension, and elevation (i.e., general interpersonal distress) from the IIP-C. BPD symptom count was unassociated with both Domineering ($r = .09$; $p = .16$) and Affiliative ($r = .11$; $p = .07$) problems, but was significantly associated with elevation ($r = .32$; $p < .001$). Thus, a dimensional approach to relating the content of the IIP-C to BPD symptoms suggests that this diagnosis is unassociated with a specific interpersonal style.

Second, we applied the structural summary method to the interpersonal profile of the whole sample. Circumplex scale scores are expected to follow a profile pattern defined by a cosine curve (Gurtman & Pincus, 2003; Wright et al., 2009). Figure 1, Panel B provides an example of this pattern. This profile can be compared to the expected cosine pattern using an R^2 statistic that reflects the prototypicality of the profile, with values of $R^2 > .80$ indicating good fit. In prototypical profiles, the entire profile can be summarized using three parameters, elevation, amplitude, and angular displacement, which have specific substantive interpretations. *Elevation* is the mean of the scale scores. All scales of the IIP-C capture maladaptive content, and *elevation* captures general interpersonal distress. *Amplitude* is calculated as the difference between the mean score (i.e., *elevation*) and the peak of the curve, and it captures the differentiation of the interpersonal content of the curve. Finally, *angular displacement* refers to the location of the peak of the curve, and it describes the primary interpersonal theme of the profile. In addition to the structural summary method for evaluating IPC profiles, the degree of overlap in content among profiles can be evaluated using circular statistics (for a detailed review of these methods, see Wright et al., 2009). Low prototypicality and high angular variance suggest that a group is interpersonally heterogeneous, with the possibility of more homogeneous subgroups.

We expected that the profile for the entire sample would be “nonprototypical” in nature. As can be seen in leftmost column of Table 1, the R^2 value suggests that the sample as a whole does not have a highly prototypical profile ($R^2 = .77$), although the profile is elevated (1.08 *SDs*) and angular heterogeneity is high ($V_0 = 79^\circ$). Thus, the profile for the whole sample is an aggregate of different individual profiles from participants who are interpersonally distressed. It is plausible, however, that the sam-

TABLE 1. Circular Statistics and Structural Summary Parameters for Full Sample and by Class

LCA Class N (%) Label	Total Sample 255	Class 1 22 (9%) Nonassertive	Class 2 57 (22%) Vindictive	Class 3 50 (20%) Avoidant	Class 4 17 (7%) Exploitable	Class 5 22 (9%) Intrusive	Class 6 80 (31%) Exploitable
Circular Statistics							
Mean	277°	276°	130°	229°	331°	43°	321°
Variance (V_θ)	79°	13°	31°	19°	14°	21°	47°
95% CI High	287°	281°	138°	234°	337°	52°	331°
95% CI Low	267°	271°	122°	223°	324°	35°	310°
Structural Summary Parameters							
Displacement	273°	276°	131°	228°	330°	44°	318°
Amplitude	0.26	1.69	0.57	0.99	1.65	1.05	0.44
Elevation	1.08	1.65	0.63	1.08	1.27	1.30	1.09
R^2	0.77	0.94	0.98	0.88	0.98	0.96	0.93

Note. LCA = latent class analysis; V_θ = angular variance; R^2 = goodness-of-fit to a cosine curve.

ple contains a mixture of subgroups that have a higher degree of interpersonal homogeneity, and we used LCA analyses to evaluate this possibility.

LATENT CLASS ANALYSIS AND STRUCTURAL SUMMARY ANALYSIS OF RESULTANT CLASSES

LCA is a mixture modeling approach that identifies latent classes of individuals who share similar profiles of responses to a set of observed variables (Collins & Lanza, 2010). LCA simultaneously estimates latent groups of individuals based on patterns of mean scores and the posterior probability that an individual belongs to a given group. We conducted an exploratory LCA with Mplus 6.12 (Muthén & Muthén, 2011) using the eight IIP-C octant scales as observed variables. Octant scores were ipsatized prior to the LCA to minimize the effect of general interpersonal distress on the solution (i.e., an individual’s average octant score was subtracted from each of the octant scale scores). Our goal was to estimate classes based primarily on interpersonal *style*, not *severity* of distress. To select among models, we relied on the Bayesian Information Criterion (BIC; Schwarz, 1978) and the second order bias (i.e., small sample) corrected Akaike Information Criterion (AICc; Sugiura, 1978); the latter is recommended when the ratio of subjects to parameters is small (<40; Burnham & Anderson, 2002; Hurvich & Tsai, 1994). Lower values of both the BIC and the AICc are indicative of better model fit. We estimated models with increasing numbers of classes starting with one and continuing until both the BIC and AICc began to increase in value. In applied research, it is common for the BIC and the AICc to disagree on the best solution (Vrieze, 2012). Therefore, interpretability and the structural summary parameters served as additional arbiters of model selection.

We performed two latent class analyses. During the initial LCA, consideration was given to all models from six to eight classes based on the BIC and AICc. With the eight-class solution, two small classes composed of outliers were identified ($n_s = 3$ and 4, respectively). Therefore, a second

LCA was conducted with these outliers removed. In the second LCA, the BIC favored a six-class model, whereas the AICc gave roughly equal weight to six-, seven-, and eight-class solutions. The seven- and eight-class solutions included two small classes ($n_s = 4$ and 6, respectively), although these participants were not clear outliers, unlike the initial LCA. Moreover, the larger groups in the six-class solution were identical to the six classes from the initial analysis, indicating that they were robust to the removal of outliers. Thus, we regard the six-class solution as the optimal model for the current data. Table 2 summarizes the model fit statistics for the final LCA. Figure 2 illustrates the scatter of individuals within interpersonal space defined by the dimensions of Agentic and Communal problems (Panel A) and the individuals grouped by class from the final LCA (Panel B).

Circular statistics (Mardia & Jupp, 1999) and group-based structural summary parameters (Gurtman & Pincus, 2003; Wright et al., 2009) were calculated for each of the six classes and are summarized in Table 1. Circular statistics quantify the amount of variability in interpersonal content (V_θ) among individuals within each group, including confidence intervals for the mean. The results demonstrated a clear reduction in interpersonal heterogeneity by going from the whole sample to the individual classes. The classes did not overlap in interpersonal theme, with one exception. Class 6 overlapped with Class 4, as both were Exploitable in theme. What distinguished these classes was the level of interpersonal differentiation in the profile (i.e., amplitude). Class 4 was highly Exploitable, whereas Class 6 was only modestly so. The interpersonal profiles for each of the six classes were highly prototypical, with all R^2 values $\geq .88$. All profiles were elevated, indicating that all were interpersonally distressed. Even the least distressed class was .63 SDs above the normative mean. Classes differed in the level of differentiation in their interpersonal profiles, with Classes 2 and 6 being somewhat less differentiated than the others, although with clearly peaked themes. The six classes from the final model were labeled based on their peak interpersonal octant and were Nonassertive, Avoidant, extreme and moderate Exploitable, Intrusive, and Vindictive (see Table 1).

TABLE 2. Model Fit Statistics for Initial and Final Latent Class Analyses

	K	Initial Analysis				Final Analysis			
		LL	AICc	BIC	ENT	LL	AICc	BIC	ENT
1 Class	16	-2705.11	5444.50	5498.88	—	-2547.19	5128.73	5182.59	—
2 Class	25	-2553.34	5162.36	5245.22	0.77	-2392.96	4841.77	4923.75	0.82
3 Class	34	-2468.04	5014.89	5124.48	0.82	-2309.54	4698.26	4806.54	0.83
4 Class	43	-2396.18	4896.30	5030.64	0.83	-2241.92	4588.38	4720.91	0.84
5 Class	52	-2353.64	4838.57	4995.43	0.85	-2203.14	4538.54	4692.97	0.85
6 Class	61	-2315.22	4791.62	4968.45	0.87	-2176.14	4514.95	4688.60	0.86
7 Class	70	-2291.38	4776.79	4970.66	0.86	-2158.66	4513.48	4703.26	0.87
8 Class	79	-2267.82	4765.87	4973.40	0.88	-2140.30	4513.84	4716.16	0.85
9 Class	88	-2250.19	4770.74	4988.01	0.88	-2121.99	4518.50	4729.17	0.86

Note. Initial Analysis $N = 255$; Final Analysis $N = 248$. K = number of estimated parameters; LL = log-likelihood; AICc = second-order bias (i.e., small sample) corrected Akaike information criterion; BIC = Bayesian information criterion; ENT = entropy.

COMPARING THE CLASSES ON BPD SYMPTOMS AND AUXILIARY VARIABLES

In order to understand further the nature of these interpersonal classes, we compared them on BPD symptoms and additional variables such as demographic features, clinical syndromes, PD symptomatology, and self-reported distress. Individuals were assigned their most probable class based on the model-estimated posterior probability of class membership. This approach was supported by the high entropy value (i.e., >.80; Clark & Muthén, 2009) indicating low uncertainty about class membership. No class could be treated conceptually as the reference group because they differed primarily in content, not severity. Thus, we used multinomial logistic regression, varying the reference class to cover all possible comparisons, with the classes regressed on the predictors. Past work suggests that this approach compares favorably to others in terms of power to detect group differences (Clark & Muthén, 2009).

Table 3 summarizes the class comparisons on the total BPD symptom count and the individual criteria. In terms of the total count, there were few differences. Only the Intrusive class reliably differed from other classes, having a higher average symptom count than the Vindictive, Avoidant, and moderately Exploitable classes. On four of the eight *DSM-III-R* BPD criteria—intense relationships, impulsivity, affective instability, and frantic efforts to avoid abandonment—no differences were observed across classes. Differences were observed, however, in the criteria for inappropriate anger, suicide/self-harm, identity disturbance, and chronic emptiness. With few exceptions, the differences observed were among the Vindictive, Nonassertive, and extreme Exploitable classes, such that the Vindictive class was higher on anger but lower on the other three criteria, consistent with the interpersonal themes of the classes. Table 4 contains the results of targeted follow-up questions about suicide attempts and self-harm that serve to clarify the nature of the class differences on the criterion related to these issues. The differences appeared to be related to self-harm as opposed to suicide attempts, with higher rates of self-harm

TABLE 3. Borderline Personality Disorder Criteria by Latent Class

Label N	Class 1 Nonassertive 22	Class 2 Vindictive 57	Class 3 Avoidant 50	Class 4 Exploitable 17	Class 5 Intrusive 22	Class 6 Exploitable 80
Mean BPD Count (SD)	4.73 (1.20) _{a,b}	4.39 (1.26) _a	4.62 (1.48) _a	5.12 (1.69) _{a,b}	5.59 (1.47) _b	4.73 (1.56) _a
Intense Relationships	59% _a	67% _a	54% _a	71% _a	77% _a	70% _a
Impulsivity	55% _a	65% _a	62% _a	71% _a	82% _a	69% _a
Affective Instability	68% _a	75% _a	76% _a	76% _a	86% _a	71% _a
Inappropriate Anger	50% _a	86% _b	72% _{a,b}	53% _a	86% _{b,c}	69% _{a,c}
Suicide/Self-Harm	68% _a	37% _b	50% _{a,b}	59% _{a,b}	64% _{a,b}	43% _b
Identity Disturbance	73% _a	42% _b	62% _a	71% _a	55% _{a,b}	56% _{a,b}
Chronic Emptiness	86% _a	49% _b	66% _{a,b}	88% _a	73% _{a,b}	65% _{a,b}
Avoid Abandonment	14% _a	18% _a	20% _a	24% _a	36% _a	30% _a

Note. N = 248. Subscripts denote differences between classes in multinomial logistic regression models.

TABLE 4. Self-Reported Symptoms and Distress and Clinician-Rated Depression, Anxiety, and Personality Dysfunction

Label	Class 1 Nonassertive 22	Class 2 Vindictive 57	Class 3 Avoidant 50	Class 4 Exploitable 17	Class 5 Intrusive 22	Class 6 Exploitable 80
Symptomatic Distress						
BSI_GSI	1.55 ^{a,b,c}	1.23 ^b	1.46 ^{a,b,c}	1.74 ^{a,c}	1.72 ^a	1.34 ^c
IIP Elevation	1.65 ^a	0.63 ^b	1.08 ^c	1.27 ^{a,c}	1.30 ^{a,c}	1.09 ^c
Suicide/Self-Harm						
Lifetime Suicide	48% ^a	36% ^a	45% ^a	36% ^a	50% ^a	39% ^a
Past 2 years Suicide	30% ^a	18% ^a	17% ^a	23% ^a	14% ^a	21% ^a
Lifetime Self-Harm	76% ^a	38% ^b	43% ^b	36% ^{a,b}	55% ^{a,b}	42% ^b
Past 2 years Self-Harm	48% ^a	18% ^b	17% ^b	31% ^b	38% ^{a,b}	25% ^b

Note. $N = 248$. Subscripts denote differences between classes in multinomial logistic regression models.

among the Nonassertive class relative to the Vindictive, Avoidant, and extreme Exploitable classes.

Table 5 summarizes the demographic features and psychiatric comorbidity across the classes. No differences in age or lifetime marriage were noted, although minor differences were observed in the proportion of female and white individuals in each class. No differences in current Axis I rates were found, and minimal differences in the total number of past diagnoses were observed. No differences were observed in the features for paranoid, schizotypal, or narcissistic PDs. The majority of the differences observed in the remaining PDs were consistent with the prototypical styles associated with these diagnoses (e.g., Pincus & Wiggins, 1990). For example, the highest rate of avoidant PD symptoms was found in the Avoidant class, and the lowest rate of dependent criteria was found in the Vindictive class. The highest rates of histrionic features were found in the Intrusive and extreme Exploitable classes, whereas the highest rate of antisocial features was found in the Vindictive class. Interestingly, it was the Intrusive class that showed the highest rate of childhood conduct problems, and it was also a close second in adult antisocial features. Finally, Table 4 contains differences in self-reported symptomatic distress. The Vindictive class was the lowest in any domain, including generalized interpersonal distress. In contrast, the Nonassertive and extreme Exploitable classes were generally highest.

DISCUSSION

The current study was motivated by an interest in clarifying the interpersonal profiles that characterize BPD. Clinical observations have long suggested that patients with BPD are a phenotypically diverse group in terms of their interpersonal characteristics (e.g., Kernberg, 1984; Linehan, 1993). Our study built on prior efforts to address these issues empirically (Bradley, Conklin, & Westen, 2005; Critchfield et al., 2008; Hallquist & Pilkonis, 2012; Lenzenweger, Clarkin, Yeomans, Kernberg, & Levy, 2008) by exploring the heterogeneity in interpersonal profiles reported by a large group of individuals with prominent borderline pathology.

TABLE 5. Demographics and Psychiatric Co-occurrence by Latent Class

Label	Class 1		Class 2		Class 3		Class 4		Class 5		Class 6	
	Nonassertive 22	Vindictive 57	Avoidant 50	Exploitable 17	Intrusive 22	Exploitable 80						
Demographics												
Age (SD)	37.18 (10.9) ^a	36.67 (10.37) ^a	34.34 (8.68) ^a	39.00 (11.85) ^a	33.68 (10.03) ^a	37.07 (10.22) ^a						
Female	91% ^a	74% ^{a,b}	66% ^b	94% ^a	73% ^{a,b}	74% ^{a,b}						
White	96% ^a	72% ^b	74% ^{a,b}	88% ^a	91% ^{a,b}	77% ^b						
Ever Married	46% ^a	47% ^a	44% ^a	59% ^a	32% ^a	50% ^a						
Axis I												
Current Axis I	1.36 (.66) ^a	1.28 (.82) ^a	1.52 (.61) ^a	1.24 (.66) ^a	1.55 (.67) ^a	1.49 (.76) ^a						
Past Axis I	1.41 (.67) ^a	1.75 (.76) ^{a,b}	1.88 (.82) ^b	1.59 (.71) ^{a,b}	2.00 (.76) ^b	1.78 (.81) ^{a,b}						
Axis II												
Paranoid	1.82	2.50	2.30	1.35	2.18	2.13						
Schizoid	0.23 ^a	0.36 ^a	0.92 ^a	0.24 ^a	0.09 ^a	0.21 ^{a,b}						
Schizotypal	0.55	0.48	1.02	0.47	0.09	0.53						
Conduct	0.86 ^a	2.27 ^{a,b}	2.14 ^{a,b}	0.71 ^a	3.18 ^a	1.39 ^a						
Antisocial	0.68	3.96 ^b	2.20 ^{c,d}	1.24 ^{a,c}	3.73 ^{b,d}	2.36 ^{c,d}						
Histrionic	2.50 ^{a,b}	3.48 ^{a,b,c}	2.20 ^b	5.29 ^{c,d}	5.27 ^d	3.55 ^a						
Narcissistic	3.27	4.34	3.50	4.24	4.64	4.11						
Avoidant	3.64 ^a	1.48 ^b	4.64 ^{a,c}	2.24 ^a	1.68 ^{a,b}	2.54 ^a						
Dependent	5.23	2.75 ^b	4.04	5.00	5.55	4.71 ^{a,c}						
Obsessive	2.86 ^{a,c}	1.25 ^{b,c}	3.24 ^c	1.53 ^{a,b}	1.77 ^{a,b}	2.04 ^a						
Passive-Aggressive	1.82 ^a	3.11 ^{a,b}	3.50 ^b	2.65 ^{a,b}	3.00 ^a	3.16 ^a						

Note. N = 248. Current and past Axis I diagnosis counts limited to affective, anxiety, and substance use diagnoses. Subscripts denote significant differences between classes in multinomial logistic regression models.

Consistent with our expectations, we found that total BPD symptoms were associated with general interpersonal distress (i.e., IIP-C elevation), but were not associated with the dimensions of agentic or communal problems. Also as hypothesized, the entire sample had highly heterogeneous interpersonal styles (i.e., high angular variance) and a general profile with only modest prototypicality. On the whole, the entire sample was associated with a nonassertive interpersonal profile, indicating that there was a modest average tendency toward submissive problems. However, the LCA showed that within this global pattern, there were subgroups with quite distinct profiles. The six classes from the final model were labeled based on their peak interpersonal octant and were Nonassertive, Avoidant, extreme and moderate Exploitable, Intrusive, and Vindictive. Subsequent circumplex-based analyses demonstrated that these groups were homogeneous and had highly prototypical interpersonal profiles. This finding confirms our predictions that individuals with borderline pathology comprise an interpersonally heterogeneous group with several distinctive styles rather than a single group with an undifferentiated (i.e., weak) interpersonal profile that is shared across individuals.

In spite of our efforts to remove the effect of general severity of interpersonal problems on class estimation by ipsatizing the IIP-C scores, classes differed in their levels of self-reported distress. In particular, more submissive classes reported greater distress consistent with other samples (Salzer et al., 2013). By contrast, we did not observe strong differences across classes in the presence of particular BPD criteria. There was a tendency, however, for classes with more submissive interpersonal themes (i.e., Nonassertive, Exploitable) to endorse criteria associated with pathology of the self (e.g., chronic emptiness, identity diffusion) at higher rates, lending credence to Pincus's (2011) suggestion that self-pathology reflects failures in effective Agency. Other notable differences among classes included the elevated rates of self-injury in the Nonassertive class; antisocial behavior and inappropriate anger in the Vindictive class; and histrionic symptoms among the classes with "warm" interpersonal pathology (i.e., Intrusive and Exploitable classes). A consistent theme emerged between the Nonassertive and Vindictive classes in terms of the target of aggression (i.e., self vs. other). Thus, these classes are associated with clinical phenomena that are often of high priority (e.g., self-injurious behavior) and may have a large impact on the treatment alliance (e.g., antisocial behavior and aggression).

The six classes found here are a larger number than those in previous investigations of phenotypic heterogeneity in BPD. There are two likely explanations. First, we used a larger sample than prior analyses. With the exception of Salzer et al. (in 2013), the previous maximum was 100. With a larger sample, there is greater power to detect latent subgroup differences (Ning & Finch, 2005). Second, we used IIP-C octants as opposed to the primary dimensions as observed variables in our models, which likely resulted in greater resolution of subgroups relative to previous studies.

Five of the six groupings that emerged here correspond to those found in the similarly sized Salzer et al. (2013) sample, with the additional grouping in our sample associated with Intrusive problems.

A frequently cited fact about the polythetic nature of the *DSM-IV*'s BPD diagnosis is that it creates the potential for a high degree of diagnostic heterogeneity (i.e., with only five of nine criteria required for diagnosis, there are 256 ways to meet the diagnosis). However, empirically, this group of nine criteria tends to cohere, resulting in quantitatively (not qualitatively) distinct groupings in person-oriented analyses, and parsimonious unidimensional solutions in variable-oriented analyses (Conway, Hammen, & Brennan, 2012; see Hallquist & Pilkonis, 2012, for a review). Thus, there appears to be a unifying pathology associated with BPD as represented in the extant diagnostic criteria, even as clinical observation and theory posit individual differences in the manifestation of the core impairments. As our results demonstrate, in spite of the coherence in the BPD criteria, individuals high in borderline pathology are interpersonally quite diverse.

This fact highlights the inherent tension in categorizing and diagnosing individuals based exclusively on shared clinical features when they may differ dramatically in others. The pressing issue is whether the differentiating features are also scientifically and clinically meaningful. In the current study, we demonstrate that interpersonal variability in BPD is in fact associated with differences in important clinical features. This finding, especially when considered in the context of others reviewed here, argues against the notion of a category of homogeneous individuals, even as they share similar impairments. From a construct perspective, it is not inherently problematic to conceptualize borderline pathology as a grouping of shared features certain individuals may express as part of their overall clinical picture. Problems arise when individuals are treated as members of a uniform, discrete class, as is the case in the extant diagnostic system. This poses scientific problems when the actual heterogeneity is ignored in the pursuit of endophenotypes and effective treatments, and clinically this is problematic because there is currently no formal way to convey heterogeneity coherently and parsimoniously within the diagnostic system. The only available way is through "comorbid" or "not otherwise specified" diagnoses, which are notorious for being cumbersome and scientifically dubious or vague and imprecise, respectively.

One approach to addressing this difficulty is to augment standard psychiatric diagnosis with additional assessment materials, such as the IIP-C or other IPC measures. The IPC model is both easily taken from "bench to bedside," given that it is just two dimensions, and clinically compelling because it is derived from observations of patient transactions (Freedman, Leary, Ossorio, & Coffey, 1951). An interpersonal assessment at the outset of treatment might indicate which individuals are prone to externalizing pathology and legal trouble (i.e., Vindictive class); which are interpersonally demanding (i.e., Intrusive and Exploitable classes); and which

respond to stress with withdrawal and passivity (i.e., Nonassertive and Avoidant classes). In this context, we note that the identified classes should not be reified as BPD “subtypes” per se, but rather as a parsing of the high degree of heterogeneity in the interpersonal manifestation of this diagnosis. As can be seen in Figure 2, participants covered the entire IPC space—the correlational results suggest that the broad interpersonal domains of Agency and Communion are nearly orthogonal with BPD. Accordingly, they are better construed as heuristics as opposed to a finite set of interpersonal manifestations of BPD. In this vein, these heuristics are not limited to BPD, but rather are transdiagnostic profiles that provide additional clinical information beyond a number of diagnoses (e.g., Ambwani & Hopwood et al., 2009; Cain et al., 2012; Przeworski et al., 2011).

Interpersonal heterogeneity has been discussed in a number of ways with regard to BPD. The focus here is on heterogeneity in terms of dispositional differences, although others have observed that individuals with BPD have marked temporal heterogeneity in interpersonal features (e.g., Russell, Moskowitz, Zuroff, Sookman, & Paris, 2007; Schmideberg, 1959). Despite the hallmark of variability characteristic of this disorder, the results here suggest that temporal oscillations occur within the context of coherent dispositional profiles. Accordingly, it is likely that a BPD patient’s characteristic interpersonal style influences psychotherapy process and outcome, as is the case for other disorders (e.g., Alden & Capreol, 1993; Cain, Pincus, & Grosse Holtforth, 2010; Salzer et al., 2008). For example, individuals in the Vindictive group may require a different interpersonal stance than those in the Nonassertive or Intrusive group. Future research on BPD treatment should consider including measures related to interpersonal disposition at the outset of psychotherapy to begin addressing this issue.

Speculating about longitudinal and dynamic processes associated with

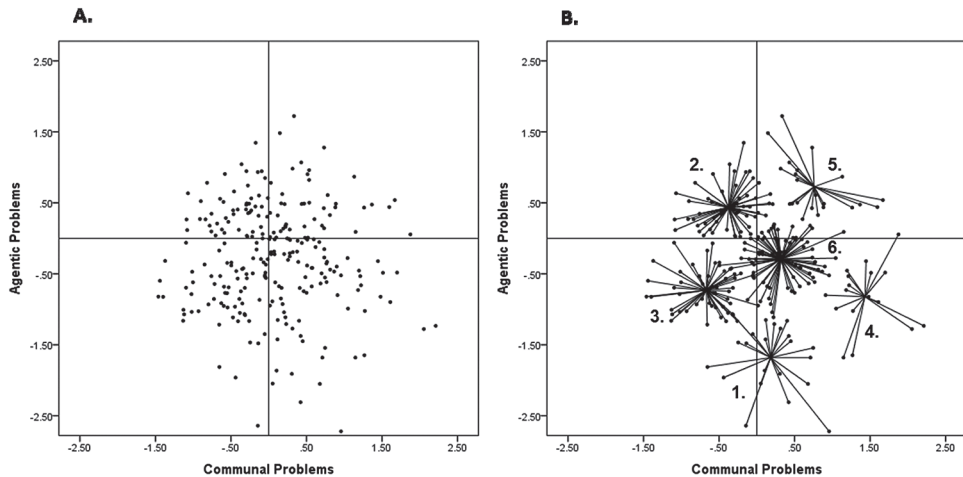


FIGURE 2. Scatter plots of the retained sample (Panel A) and by class with individual cases connected to latent class centroid (Panel B).

these interpersonal styles raises questions about their developmental origins. Developmental models of BPD highlight the role of early life experience interacting with temperamental vulnerability (e.g., Clarkin, Yeomans, & Kernberg, 2006; Linehan, 1993). An invalidating, abusive, or neglectful early environment is hypothesized to interact with a temperament characterized by reactivity and a tendency to experience strong negative emotions, but this general characterization does not describe the developmental antecedents of specific interpersonal styles in BPD. Benjamin's (2003; Critchfield & Benjamin, 2008) copy process theory may provide additional specificity for capturing the observed diversity in the interpersonal expression of BPD. The implication is that abusive or invalidating early environments can convey (or alternatively the individual may attend to) different interpersonal messages that unfold across a lifetime through the copy processes of identification, introjection, and recapitulation. Therefore, studies of the development of BPD should include a degree of specificity in the assessment of early interpersonal environment that matches the degree of interpersonal differentiation observed in adults with this disorder.

An additional naturalistic research question follows from this study: To what degree are these profiles stable? Past research with young adults has shown considerable variability in the stability of interpersonal profiles (Wright, Pincus, & Lenzenweger, 2012). However, it remains unknown to what degree profile stability is influenced by different forms of personality pathology or differences in developmental stage. Person-centered approaches to studying change can be put to good use examining these questions (cf. Wright, Pincus, & Lenzenweger, 2011).

A limitation of our study was its use of the *DSM-III-R* diagnostic criteria as opposed to the *DSM-IV* criteria. The diagnostic construct for BPD was essentially unchanged in *DSM-IV*, however, save for the addition of one additional criterion. In practice, only five additional individuals would have been included had we used the *DSM-IV* criteria. An additional limitation is that the assessment of interpersonal problems was based solely on self-reports.

In spite of these limitations, the current study advances the understanding of heterogeneity in the interpersonal presentation of BPD by relying on a general model of interpersonal behavior, the IPC, which has a long-standing history of clinical relevance (Pincus & Wright, 2011). This model is also relevant for the debate over how best to conceptualize PD and to present it in the pages of the *DSM-5* (Wright, Pincus, Hopwood, et al., 2012). At the time of this writing, the extant model (i.e., *DSM-IV*) will remain in place, unchanged. Yet the American Psychiatric Association is encouraging the study of an additional full model, which prioritizes adaptive failures in self-functioning and interpersonal functioning as a general criterion for personality disorder along with descriptions using dimensional profiles of traits. In this context, Pincus (2011; but see also Pilkonis, Hallquist, Morse, & Stepp, 2011) noted that impairments in self-functioning reflect failures in effective Agency and impairments in interpersonal

functioning reflect failures in effective Communion. The current research shows that for those individuals with the cardinal difficulties associated with BPD, there is still important information to be gleaned from their characteristic interpersonal style operationalized with the IPC. Future research should seek to understand both those factors that lead to the development of the shared pathology of these individuals and those factors that contribute to the differentiation of interpersonal functioning among them.

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